REMARKS

Prior to the present amendment, claims 18-47 were pending in the present application. By the present amendment, independent claims 18, 25, and 36 have been amended. Thus, claims 18-47 remain in the present application and claims 46-47 have been allowed. Reconsideration and allowance of outstanding claims 18-45 in view of the above amendments and the following remarks are requested.

A. Rejection of Claims 18-22 under 35 USC §103(a)

The Examiner has rejected claims 18-22 under 35 USC §103(a) as being unpatentable over alleged Applicant's "admitted prior art" in combination with U.S. patent number 5,321,302 to Hidenori Shimawaki (hereinafter "Shimawaki"). For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claim 18, is allowable.

The present invention, as defined by amended independent claim 18, includes, among other things, a base comprising kinetically controlled growth mode single crystal silicon-germanium and forming a base-collector junction with a single crystal silicon collector, a base contact comprising mass controlled growth mode polycrystalline silicon-germanium, where the base contact is situated over and in contact with a silicon oxide structure, where the silicon oxide structure is situated in a substrate, where the base contact and the base are characterized by a controlled deposition ratio, and where the controlled deposition ratio provides a base contact deposition rate that is higher than a

base deposition rate so as to cause a base contact thickness to be greater than a base thickness. As disclosed in the present application, a base and a base contact are deposited epitaxially in a nonselective process such that the base, which is deposited on single crystal silicon, comprises single crystal silicon-germanium and the base contact, which is deposited on a silicon oxide structure, comprises polycrystalline silicon-germanium.

As disclosed in the present application, the base and base contact are connected to each other at an interface between the contact polycrystalline material and the base single crystal material. As disclosed in the present application, by appropriately controlling deposition temperature and pressure, the present invention achieves growth of single crystal silicon-germanium in the base in a kinetically controlled growth mode and growth of polycrystalline silicon-germanium in base contact at a much higher rate in a mass controlled mode. For example, in one embodiment, the present invention achieves a polycrystalline silicon-germanium base contact that grows twice as fast as a single crystal silicon-germanium base.

Thus, the present invention achieves a method for controlling the deposition of polycrystalline material independently of the deposition of single crystal material in a silicon-germanium nonselective epitaxial process. Thus, by controlling the rate of polycrystalline silicon-germanium base contact deposition independently of the rate of single crystal silicon-germanium base deposition in a nonselective deposition process, the present invention advantageously provides a base contact thickness that can be selected to achieve a desirably low contact resistance while independently optimizing base thickness

for a particular germanium concentration. In one embodiment, the present invention's method for controlling the deposition of polycrystalline material independently of the deposition of single crystal material in a silicon-germanium nonselective epitaxial process advantageously achieves a single crystal silicon-germanium base having a base thickness and situated on a single crystal silicon collector and a polycrystalline silicon-germanium contact having a base contact thickness and situated on a silicon oxide structure, wherein the base contact thickness is substantially greater than the base thickness.

On page 3 of the Office Action dated July 19, 2005, the Examiner has stated that pages 2 through 5 of the present application (i.e. "Background Art" section of the present application) teach a structure comprising a single crystal silicon-germanium base and a polysilicon base contact, where the base contact and the base are inherently characterized by a deposition ratio. However, Applicant respectfully submits that pages 2 through 5 of the present application fail to teach, disclose, or remotely suggest a base and a base contact that are characterized by a controlled deposition ratio, where the base forms a base-collector junction with a single crystal silicon collector and the base contact is situated over and in contact with a silicon oxide structure in a substrate, and where the base contact thickness is greater than the base thickness, as specified in amended independent claim 18.

As discussed above, by achieving independent control of base thickness and base contact thickness by controlling the deposition ratio of polycrystalline silicon-germanium to single crystal silicon-germanium in a silicon-germanium nonselective epitaxial process,

the present invention advantageously provides a sufficiently thick, low resistance base contact and an optimized base thickness that does not exceed a critical thickness. In contrast, pages 2 through 5 of the present application disclose a conventional deposition process that results in a base and a base contact having a substantially similar thickness. As such, the conventional deposition process disclosed on pages 2 through 5 of the present application does not and cannot achieve a single crystal silicon-germanium base in electrical contact with a polycrystalline silicon-germanium base contact that is situated over and in contact with a silicon oxide structure, where the silicon oxide structure is situated in a substrate, where the base contact and the base are characterized by a controlled deposition ratio, and where the controlled deposition ratio causes a base contact thickness to be greater than a base thickness, as specified in amended independent claim 18.

In contrast to the present invention as defined by amended independent claim 18, Shimawaki does not teach, disclose, or suggest a base comprising kinetically controlled growth mode single crystal silicon-germanium and forming a base-collector junction with a single crystal silicon collector, a base contact comprising mass controlled growth mode polycrystalline silicon-germanium, where the base contact is situated over and in contact with a silicon oxide structure, where the silicon oxide structure is situated in a substrate, where the base contact and the base are characterized by a controlled deposition ratio, and where the controlled deposition ratio provides a base contact deposition rate that is higher than a base deposition rate so as to cause a base contact thickness to be greater than a base

thickness. Shimawaki is directed to a heterojunction bipolar transistor having improved cut-off frequency and maximum oscillation frequency. See, for example, column 3, lines 25-28.

Shimawaki specifically discloses primary base layer 25 situated adjacent to secondary base layer 27, where primary base layer 25 is situated on a central zone of collector layer 24 and secondary base layer 27 is situated on a peripheral zone collector layer 24. See, for example, column 9, lines 23-39 and Figure 8 of Shimawaki. In Shimawaki, base electrode 32 is situated on secondary base layer 27 and emitter layer 26 is situated on primary base layer 27. See, for example, column 9, lines 27-57 and Figure 8 of Shimawaki. However, Shimawaki fails to teach, disclose, or remotely suggest a base comprising kinetically controlled growth mode single crystal silicon-germanium and forming a base-collector junction with a single crystal silicon collector, a base contact comprising mass controlled growth mode polycrystalline silicon-germanium, where the base contact is situated over and in contact with a silicon oxide structure, where the silicon oxide structure is situated in a substrate, where the base contact and the base are characterized by a controlled deposition ratio, and where the controlled deposition ratio provides a base contact deposition rate that is higher than a base deposition rate so as to cause a base contact thickness to be greater than a base thickness, as specified by amended independent claim 18. Thus, Shimawaki fails to cure the basic deficiencies of the conventional deposition process disclosed on pages 2 through 5 of the present application.

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claim 18, is patentable over the conventional deposition process disclosed on pages 2 through 5 of the present application and Shimawaki. As such, claims 19-22 depending from amended independent claim 18 are, *a fortiori*, also patentable over the conventional deposition process disclosed on pages 2 through 5 of the present application and Shimawaki for at least the reasons presented above and also for additional limitations contained in each dependent claim.

B. Rejection of Claims 24-40 and 42-45 under 35 USC §103(a)

The Examiner has rejected claims 24-40 and 42-45 under 35 USC §103(a) as being unpatentable over alleged Applicant's "admitted prior art." For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claims 25 and 36, is allowable. Amended independent claims 25 and 36 include similar limitations as amended independent claim 18. Thus, for similar reasons as discussed above, the present invention, as defined by amended independent claims 25 and 36 is also patentable. As such, claim 24 depending from amended independent claim 18, claims 26-35 depending from amended independent claim 25, and claims 37-40 and 42-45 depending from amended independent claim 36 are, *a fortiori*, also patentable for at least the reasons presented above and also for additional limitations contained in each dependent claim.

C. Conclusion

Based on the foregoing reasons, the present invention, as defined by amended independent claims 18, 25, and 36, and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, claims 18-45 are patentably distinguishable over the art cited by the Examiner. For all the foregoing reasons, an early allowance of outstanding claims 18-45 and an early Notice of Allowance for all claims 18-47 are respectfully requested.

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Respectfully Submitted,
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